

CONTACT FORCING FINS FOR SWIMMING  
POOL BRUSHES AND THE LIKE

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application claims priority under 35 U.S.C. §119(e)  
5 to U.S. Provisional Application Serial No. 60/415,183, filed  
on October 1, 2002.

FIELD OF THE INVENTION

The present invention relates generally to a swimming  
pool cleaning implement, such as a swimming pool brush.

10 BACKGROUND

In the maintenance of swimming pools and the like, it  
frequently is necessary or desirable to mechanically brush the  
submerged surfaces of the pool. Regular brushing of the  
submerged pool surfaces is desirable to prevent the  
15 accumulation on the surfaces, or removal from those surfaces,  
of algae. Brushing also is needed to dislodge accumulations  
of dirt, leaves and other things from the submerged surfaces  
so they can be extracted from the pool water by filters in  
pool water circulation systems.

20 Effective brushing of the submerged surfaces of a  
swimming pool can require physical strength by the person  
doing the brushing. Physical strength by the brusher is  
needed because the distance from the brush, along an elongate  
pole to the end of which the brush is coupled, to the brusher  
25 can be on the order of many feet, for example 8 to 16 feet,  
and that distance results in poor leverage by the brusher upon  
the brush. Effective brushing is the result of forceful  
contact by the brush with the pool surface as the brush is  
pushed along the pool surface. If the lever arm along the  
30 brush handle from the brusher (located outside and adjacent to

the pool) is great, it is difficult for the brusher to apply enough leverage to the handle to cause the brush to contact the pool surface with the desired amount of force as the brush is pushed along the pool surface. As a consequence, the  
5 brusher can become tired and/or the pool is brushed either inadequately or infrequently, either of which is inconsistent with sound pool cleaning and maintenance practices.

In light of the foregoing, it is apparent that a need exists for a way to effectively increase the amount of contact  
10 force between a submerged pool surface and a brush or other cleaning implement as it is moved along the pool surface by a person located outside the pool and manipulating the brush, e.g., via a long pole-like handle.

#### SUMMARY OF THE INVENTION

15 This invention addresses the need identified above. It does so by providing a simple, efficient, effective and economic structure which can be incorporated into the brush or other cleaning implement, or which can be mounted to the pole-like handle closely adjacent to an existing brush or other  
20 cleaning implement. The structure provided by the invention interacts with pool water as the brush or implement is moved to produce forces which urge the brush, e.g., into contact with the pool surface. Those forces augment similarly directed forces applied to the brush by the person using the  
25 brush.

The invention has utility and significance in the context, among others, of a cleaning implement coupled to an end of an elongate pole-like handle to coact with submerged surfaces of a swimming pool or the like. An apparatus  
30 according to the invention defines an elongate surface disposed proximately adjacent the implement. The surface has a length aligned along a line transversely of the length of the handle. The surface has an attitude transversely of its

length which is defined relative to the length of the handle sufficiently so that the surface develops and applies to the implement enhanced force urging the implement into contact with the submerged surface. The enhanced force is developed  
5 in response to movement of the implement in a selected direction along the submerged surface.

More specifically, the force-generating surface can be defined by elements of the implement, so that the surface is part of the structure which is coupled, preferably  
10 releaseably, to the end of the elongate handle. Alternately, the force-generating surface can be defined as features of a cleaning accessory which is connectible to the handle in close association with the implement. The surface can be continuous along its length, or it can be interrupted substantially  
15 centrally of its length.

In the context of this description, a cleaning implement can be a brush (straight, round, rectangular or otherwise suitably shaped), an abrasive tool such as a stain removal stone, or any other pool surface cleaning or treatment device  
20 which is connectible to an elongate pole and depends for effectiveness upon forceful moving contact with a pool surface.

In one embodiment, the present invention is a pool cleaning implement for cleaning a submerged surface that  
25 includes an implement body having a coupling shank attached thereto and by which an elongate pole can be connected to the implement. A fin is also connected to the implement body, such that a force generating portion of the fin is aligned along a line that is transverse to the length of the implement  
30 body, wherein the force generating portion of the fin urges the implement into contact with the submerged surface in response to movement of the implement in a selected direction along the submerged surface.

In another embodiment, the present invention is a pool  
35 cleaning implement for cleaning a submerged surface that

includes an implement body having a coupling shank attached thereto and by which an elongate pole is removably connectable to the implement body. A fin is also connected to the implement body, such that a force generating portion of the  
5 fin is aligned along a line that is transverse to a vertical axis of the implement body, wherein the force generating portion of the fin urges the implement into contact with the submerged surface in response to movement of the implement in a selected direction along the submerged surface.

10 In yet another embodiment, the present invention is a pool cleaning brush for cleaning a submerged surface that includes a brush body having bristles arranged in a pattern that extends generally along a vertical axis of the brush body. A coupling shank is attached to the brush body by which  
15 an elongate pole is removably connectable to the brush body. A fin is also connected to the brush body, such that a force generating portion of the fin is aligned along a line that is transverse to the pattern of brush bristles, wherein the force generating portion of the fin urges the brush bristles into  
20 contact with the submerged surface in response to movement of the brush in a selected direction along the submerged surface.

In still another embodiment, the present invention is an accessory useful in association with a cleaning implement attached to the end of an elongate handle for movement along a  
25 submerged surface in response to motion of the handle by a person at or near other end of the handle. The accessory functions in response to such movement to generate forces which urge the implement into contact with the submerged surface. The accessory includes a base element having a  
30 mating surface dimensioned and concavely shaped concentric to an axis thereof for stable mating with the exterior of the handle proximate to the implement. The base element defines a pair of coaxially aligned holes adapting the accessory, for stable connection to the handle with its concave surface mated  
35 to the handle. A fin is connected to the base element and has

a length extending transversely of the mating surface axis. The fin has a force generating surface which in a direction transversely of the fin length has a desired angular relation to the mating surface axis. The axis of the accessory's  
5 mating surface is located substantially centrally of the length of the fin.

#### DESCRIPTION OF THE ACCOMPANYING ILLUSTRATIONS

The above mentioned and other features and benefits of the invention are described and explained in the following  
10 description of presently preferred and other embodiments of the invention in which:

FIG. 1 is a perspective view of a pool cleaning brush which includes a pair of force generating fins;

FIG. 2 is an end elevation view of the brush of FIG.1;

15 FIG. 3 is a view of the underside of the brush of FIG. 1 showing a detent element, in place in the brush mounting shank, by which the brush is releaseably connectible to an end of a tubular operating handle;

FIG. 4 is a perspective view of the detent element apart  
20 from the brush;

FIG. 5 is a plan view of an exemplary brush component which defines the force generating surfaces;

FIG. 6 is an end view of the brush component of FIG. 5;

FIG. 7 is a top plan view of a pool cleaning accessory  
25 which is connectible to an operating handle in association with a brush, e.g., and which defines a force generating surface on a pair of aligned fins;

FIG. 8 is an end elevation view of the accessory of FIG.  
7;

30 FIG. 9 is a fragmentary top plan view of the central portion of another accessory related to the accessory of FIG. 7;

FIG. 10 is an end elevation view of the accuracy of FIG.  
9;

FIG. 11 is a side elevation view of another accessory according to this invention mounted to an operating handle to which a brush also is connected;

FIG. 12 is a rear elevation view of the accessory shown  
5 in FIG. 11.

FIG. 13 is a perspective view of an alternative embodiment of a pool cleaning brush which includes a pair of spring biased force generating fins;

FIG. 14 is a side view of the brush of FIG. 13; and

10 FIG. 15 is a perspective view of an alternative method of mounting spring biased force generating fins to a pool cleaning brush.

#### DETAILED DESCRIPTION OF THE INVENTION

FIGS. 1-3 show a pool cleaning brush 10 in which the  
15 bristles 11 are arranged in an elongate, narrow straight pattern or array. The bristles are carried in a known manner in a brush body 12 which may be modestly upturned at its ends. A connecting member 13 has an elongate strip-like base 14, from the midlength of which extends a lateral coupling shank  
20 15 having an outer surface shaped as at least a substantial part of a circular cylinder of selected diameter. The connecting member can be made of metal, whereas the brush body can be made of a synthetic material.

The brush body can be connected, such as by screws, to  
25 the elongate base of the connecting member. Especially where the length of the brush body 11 is meaningfully greater than the length of the connecting member base 14, a metal stiffening strip 16, longer than the connecting member base, is interposed between the top of the brush body and the  
30 underside of the connecting member base. Screws through the connecting member and the stiffening strip into the brush body can be used to connect those brush components together.

As shown in FIG. 2, the brush coupling shank 15 extends from the brush body 12 at right angles to the length of the

brush at its midlength and in a direction which is between horizontal and vertical relative to the brush body. That angle can be about 30°.

The brush mounting shank can be hollow and can carry  
5 inside it a device providing spring loaded detent pins which extend movably through holes in the opposite sides of the shank; see FIG. 3. FIG. 4 is an illustration of a unitary detent spring element (commonly called a "butterfly clip") 18 in which a pair of aligned detent pins 19 extend laterally  
10 from the free ends of a pair of deformable arms 20 which are connected together at their other ends. The unitary spring element can be molded synthetic material such as nylon.

The brush as thus described is commonly used with an elongate pole-like operating handle 22 (see FIG. 11). Several  
15 forms of handle are known. In general, the handles have a tool receiving end defined as an open-ended hollow circular tube near the end of which at least one pair, sometimes two pairs, of holes are located. The holes of each pair are coaxial and are located through opposite sides of the tubular  
20 end of the handle. The inner diameter of the handle tube is slightly larger than the outer diameter of the brush shank. The shank is inserted into the handle tube until the brush detent pins align with and project through aligned holes in the handle tube. In that manner the brush can be detachably,  
25 yet securely, connected to the handle.

The handle arrangements used in connection with swimming pool cleaning implements can be either fixed length hollow tubular poles or they can be of a telescoping nature. Fixed length poles typically are 8 to 16 feet long; telescoping  
30 poles are extendible to comparable lengths.

As and to the extent described above, the brush shown in FIGs. 1-3 and the detent element shown in FIG. 4 are known and are commercially available. Known variations on such a brush include brushes with completely cylindrical shanks which are  
35 secured inside the ends of operating handles by nutted bolts

passed through the handle holes and through aligned holes in the brush shank.

The component of the brush shown in FIGs. 1-3 which is novel and is an aspect of this invention is a fin plate 23 which also is shown in FIGs. 5 and 6. The fin plate can be formed from metal sheet. In the exemplary brush 10 shown in FIGs. 1-3, the fin plate has an overall length which is somewhat longer than the length of the connecting member base and shorter than the length of the stiffening strip; the fin plate length is about the same as the extent of the stiffening strip which is between the modestly upturned end margins of the strip. The fin plate has along one elongate edge thereof a strip-like mounting margin 24 of width corresponding to the width of the stiffening strip. A plurality of holes 25 are formed in the fin plate margin to accommodate the fasteners which are used to secure together the brush body, stiffening strip and connecting member as described above.

Symmetrically with respect to the midlength of the fin plate, it defines a spaced pair of forcing fins 26, each of which extends from a respective end of the plate toward but not to the midlength of the plate. As an example, the length of the fin plate may be 18 inches with a 1 inch wide mounting margin. Each of the fins may be 7 inches long with a width of 4 inches from the mounting margin. The fins connect to the plate margin. The fins preferably are flat and are inclined at an angle  $\beta$  of about  $135^\circ$  relative to the fin plate margin. The space between the fins is provided to afford user access to the detent or other connector(s) used to secure the brush to an operating handle as described above.

The fin plate is secured in the brush by interposing its edge margin between the brush stiffening strip and connecting member base before they are connected together, as by the screws mentioned above. As secured in the brush, the fins extend upwardly from the brush body generally in the same direction as, but not necessarily the same angle as, the



connecting member shank. In one embodiment, the fins are aligned along a line that is transverse to a vertical axis 12A of the brush body 12, forming an angle  $\delta$ , which in one example is approximately 45°.

5        "Push" and "pull" are used with reference to the motions imparted to the brush operating handle by a person using the brush. As a brush equipped with forcing fins of this invention is pushed across a submerged pool surface, the fin surfaces which face toward the direction in which the brush is  
10 moved, because they are inclined to the submerged surface and are not parallel to the path of brush movement, provide resistance to forward movement of the brush. Because of the inclination of the fin surfaces to the pool surface, the resistance force applied to a fin as the brush is moved  
15 forward has a downward component. That downward component of resistance force urges the brush into forceful contact with the pool surface. The magnitude of the resistance force's downward component is a function of fin area, fin inclination relative to the pool surface where the brush is located, and  
20 the speed at which the brush is moving. That magnitude can be greater than the brush-to-pool surface contact force which can be created by the application of leverage forces to the brush operating handle by the brush user; in that event the user need not strain to apply leverage to the operating handle, but  
25 may need only to push, pull and otherwise guide the brush along the submerged pool surface. Thus, the forcing fins function in use of the brush to create and apply brushing contact forces to the brush which augment, and may replace, brush contact forces produced by exertion by the brush user.  
30 The result is that the pool surfaces can be brushed more easily and effectively.

The front surface of a forcing fin is the surface to which resistance force having a downward (brush contact enhancing) component is applied. The fin front surface can be  
35 referred to as a forcing surface. While it is preferred that

a forcing surface of this invention be flat, that is not a requirement; a forcing surface can be nonplanar if desired.

It will be apparent that, in the course of brushing the submerged surfaces of a swimming pool, the brush user at times  
5 will need to pull on the operating handle to move the brush to a position where the brush can again be pushed along the pool floor or wall. As the brush is pulled, the rear surfaces of the forcing fins interact with the water to generate resistance forces which act predominantly upwardly on the  
10 fins. Those upward forces are assistive to the brush user who need not strain so hard, or at all, to lift the brush from the pool surface as the user pulls on the operating handle.

This invention also can be embodied in devices separate from a pool cleaning implement which provide forces which, in  
15 use of the implement, urge it into forceful contact with a submerged pool surface. Different forms of such devices are shown in FIGs. 7-12, and are accessories for use with such implements. FIGs. 7 and 8 show one such accessory device 30. It is comprised by a tubular sleeve 31 having an inner  
20 diameter slightly larger than the outer diameter of the implement receiving end of an operating handle for pool cleaning brushes and other implements. At diametrically opposed locations on the sleeve there are respective ones of a pair of holes 32 sized, preferably, to accommodate the ends of  
25 the detent pins 19 of a detent clip 18 as shown in FIG. 5. Respective ones of a pair of elongate forcing fins 33, disposed in alignment with each other, are affixed to the opposite sides of the sleeve. The fins preferably are flat. As affixed to the sleeve, the fins are inclined to the axis  
30 30A of the sleeve at a desired angle, such as a 15° angle. The line along which the detent accommodating holes are formed in the sleeve preferably is parallel to the line along which the fins are aligned.

As shown in FIG. 8, the line of alignment of the detent  
35 accommodating (accessory mounting) holes 32 can be in or very

close to the common plane of the fins 33; in that event, finger openings 34 are provided in the fins from the sleeve partially along the fins to enable a user to operate the detent pins when installing the accessory on, or removing it  
5 from, an operating handle. As shown in FIGs. 9 and 10, the detent pin accommodating holes in the sleeve can be spaced from the common plane of the fins, in which event finger openings in the fins are not needed.

When used with a conventional pool cleaning brush, the  
10 accessories shown in FIGs. 7-10 can be mounted to an operating handle by the same detent pins which are used to connect the brush to the handle. The brush shank fits inside the handle and the accessory sleeve fits around the outside of the handle. The manners in which the accessories develop and  
15 apply to the adjacent brush or other implement forces assistive to the user will be apparent from the foregoing explanation of the user of the brush shown in FIGs. 1-3.

In the arrangements described above and shown in FIGs. 1-10, the forcing surfaces defined by the pairs of forcing fins  
20 can be considered as separate parts of a single forcing surface disposed symmetrically with respect to the pool cleaning implement and the handle to which the implement is connected. That manner of consideration of those arrangements suggests that the invention can be embodied in an arrangement  
25 in which the forcing surface is symmetrical with respect to the handle and implement and is not centrally interrupted to accommodate the handle.

Such an arrangement is embodied in the accessory 35 shown in FIGs. 11 and 12 in which a preferably flat forcing plate 36  
30 is carried by a saddle 37 which straddles and engages sufficient length of an operating handle 22 to be stable on the handle. Depending arms 38 of the saddle are coaxially apertured to accommodate the outer ends of detents (see FIG. 5) which releasably secure the saddle to the exterior of an  
35 operating handle and the implement inside the handle. The

shank of a brush 39 is fitted into and secured to the handle end as described above.

In light of the foregoing, it is apparent that this invention can be practiced as a combination of a pool cleaning  
5 implement and a continuous forcing surface defined by structure which, with the implement, are connectible as a unit to an operating handle.

This invention also includes arrangements in which one or a pair of forcing surfaces can be adjusted in attitude  
10 relative to the length of an operating handle for a pool cleaning implement.

In any of the embodiments disclosed above, the fin plate may be spring biased. For example, FIG. 13 shows a pool cleaning brush 10' having a brush body 12 with bristles 11  
15 extending therefrom and the coupling shank 15 mounted to the brush body 12 via the connecting member 13 as described above. As shown in FIG. 13, a hinge plate 40 rotatably connects a fin plate 23' to the brush 10'.

For example, the hinge plate 40 may include a first  
20 portion 42 fastened to the fin plate 23', such as by screws, and a second portion 44 fastened to the connecting member 13, such as by screws, wherein the first and second portions 42 and 44 are connected by a pin 46 allowing for rotary movement of the first portion 42 relative to the second portion 44 and  
25 thus rotary movement of the fin plate 23' relative to the brush body 12. Alternatively, or additionally the second portion 44 may be fastened to the brush body 12.

The fin plate 23' is biased by a spring 48. For example, the spring 48 may be a torsional spring having a coiled main  
30 body disposed in surrounding relation to the hinge pin 46, with a first arm extending from the main body to contact the first portion 42 of the hinge plate 40 and a second arm extending from the main body to contact the second portion 44 of the hinge plate 40.

35 As shown in FIG. 14, in the natural biased state, the fin

plate 23' extends upwardly from the brush body 12 in a direction that is generally away from the coupling shank 15 and is transverse to the vertical axis 12A of the brush body 12, forming an angle  $\delta$ , for example, of approximately 45°.

5 In the embodiment of FIGs. 13 and 14, the brush 10' includes two fin plates 23. However, in other embodiments the brush 10' may include one fin plate 23' or any suitable number of multiple fin plates 23'. In addition, although the fin plate 23' is shown as being generally rectangular, other  
10 appropriate shapes may be used.

FIG. 15 shows an alternative means for mounting a spring biased fin plate to a brush body. For example, the depicted embodiment includes a pool cleaning brush 10" having a brush body 12 with bristles 11 extending therefrom and an elongate  
15 pole-like operating handle 22 mounted to or integrally formed with the brush body 12. The brush body 12 also includes pin holders 50 mounted thereto or integrally formed therewith, such as via a casting process.

The pin holders 50 receive the ends of a pin 46' that is  
20 connected to a fin plate 23" and allows for rotary movement of the fin plate 23" relative to the brush body 12. The fin plate 23' is biased by a spring 48'. For example, the spring 48' may be a torsional spring having a coiled main body disposed in surrounding relation to the hinge pin 46', with a  
25 first arm extending from the main body to contact the fin plate 23" and second arm extending from the main body to contact the brush body 12. In the natural biased state, the fin plate 23" extends upwardly from the brush body 12 in a direction that is generally away from the handle 22 and is  
30 transverse to the vertical axis 12A of the brush body 12, forming an angle  $\delta$ , for example, of approximately 45°.

Embodiments of the present invention that include spring biased fins facilitate the cleaning of pool walls. More force is desired when cleaning a pool wall than when cleaning a pool  
35 floor, this is a matter of the user's ability to apply

leverage to the handle. The spring allows the fin to assume an angle related to the push speed exerted by the user in an inverse relationship. As the brush is moved in a forward (push) direction along a submerged pool surface, water  
5 interacts with a spring biased fin to move the fin angularly against the bias of spring 48 so that the fin extends from the brush body generally toward the user of the brush. The faster the push speed, the flatter (more parallel) the fin will be relative to the pool surface being cleaned. At slower push  
10 speeds, however, the fin is more erect. In either case the attitude of the fin in combination with brush advance speed will produce effective contact of the brush with the pool surface. The stiffness of spring 48 is selected in light of the fin area and the brush contact enhancing force which is  
15 desired.

As previously discussed, in one embodiment, the fin extends generally in the opposite direction as the coupling shank and thus generally opposite to the elongate pool that is connected to the coupling shank. In such an orientation, when  
20 the brush is pulled toward the user, the inclined orientation of the fin resists the motion of the brush. This resistance generates a resistance force having a downward component that urges the brush into forceful contact with the pool surface.

The preceding description has been presented with  
25 references to presently preferred embodiments of the invention. Persons skilled in the art and technology to which this invention pertains will appreciate that alterations and changes in the described structures and methods of operation can be practiced without meaningfully departing from the  
30 principle, spirit and scope of this invention. Accordingly, the foregoing description should not be read as pertaining only to the precise structures described and shown in the accompanying drawings.